## AN INLAND OCCURRENCE OF MANGROVE

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Mangroves are traditionally associated with maritime habitats in the tropics, typically tidal inlets or open muddy coastlines, where they colonise mudflats which are exposed at low tide and submerged at high tide by brackish or saline water. It was with some surprise therefore that the writer, with a party travelling for purposes of vegetation survey in 1965, came upon an extensive mangrove community completely isolated from the sea and some 25 miles inland. The accompanying map shows the location which lies behind the 80-Mile Beach in the North-West of the State. This Beach, which sweeps in a long curving line from near Cape Keraudren to Cape Missiessy, a distance not of 80 miles but of 120 niles, is backed by a belt of relatively recent and unconsolidated sand dunes up to 2 miles in width. At only one point these dunes are breached by a small creek, the Wooroo Creek, which is lined with mangroves and drains part of the coastal plain behind. At the back of the dune belt there is a grassy plain of variable width, lying very little above present sea level and consisting of grey clay which suggests deposit under marine or estuarine conditions. Inland, again, of the flat coastal plain one comes abruptly to the rising ground of the interior which is based upon Tertiary saudstones with a deep soil of red sand, piled in many places into ancient dunes well vegetated with spinifex, shrubs and trees. Very often the transition from the rising ground to the coastal plain is marked by a sharp drop of some 20 feet suggesting an ancient shoreline. At the foot of this declivity there is in most parts a belt of tea-tree scrub (*Melalcuca alsophila* and *M. lasiandra*) of variable width, which appears to indicate seepage of ground water from the higher country.

At both ends of the 80-Mile Beach the coastal plain is very narrow but in the middle it widens out to a great embayment of estuarine shape, tapering into the interior of the country. Towards the head of this feature, some 20 miles from the sca, the coastal plain becomes more and more saline so that the grassy vegetation gives way to an extensive salt marsh of samphire and bare salt mud. To the north and south of this there are sand ridges connecting with those in the desert further inland. At the head again of this salt marsh is a salt creek which discharges into it, and has a course some 8 miles long, draining an extensive chain of salt pans and marshes in the desert. It is this salt creek which is lined, on either bank, by small mangrove trees (Avicennia marina).

We had approached this spot from the south, following the overland telephone line up from Callawa Station. A good road has been built along here by Wapet to facilitate their exploration in the Canning Basin. At Radi Hills, 60 miles from Callawa, a second road comes up from Wallal Downs on the coast, and joining with that from Callawa runs into the Great Sandy Desert by way of the Anketell Ridge. Beyond Radi Hills the telephone line is followed only by a sand track, and as sand ridges have to be crossed it is traversable only in a 4-wheel drive vehicle. For the first 16 miles from Radi Hills there is a bald gravel plateau covered with soft spinifex (*Triodia pungens*) with occasional shrubs of *Grevillea refracta, Gardenia keartlandii* and numerous wattles.

After this in the next six miles, seven high sand ridges are crossed, rather poorly vegetated with odd shrubs. The spinifex changes to *Plectrachne schinzii* as it does on deep sand. Then the line bends more to the east and in the next four miles crosses numerous weak sand ridges with small trees of desert walnut— *Owenia reticulata*. This brings one to the edge of the salt marsh



country which the line skirts for ten miles by heading eastwards. This country consists of glades of open samphire marsh with thickets of tea-tree (Melaleuca alsophila, M. lasiandra and M. glomerata) having a samphire ground layer. In the drier sandy parts the dwarf wattle Acacia translucens and Triodia pungens come in. At 33 miles from Radi Hills the line turns once more northward to cross the marshes, and in 3 miles more on this last flat we came to the edge of the Salt Creek, 20 feet wide and with steep banks. The telephone line of course spanned it directly but there was no crossing for the Landrover, so it was necessary to follow the creek downstream for three-quarters of a mile where it shallowed, trickling gently over a bar of deposited limestone. The whole length of the creek for this distance was lined with small trees of Avicennia marina 15 feet high.

As the creek discharges into the salt marsh not far downstream, the mangroves cannot extend much further in that direction. Their extension upstream was not investigated. At the present day there is no tidal connection with the ocean.

In order to explain this inland occurrence of mangrove. it seems plausible to suggest that it is a relic of estuarine conditions prevailing at the time of maximum eustatic rise in sea level which Churchill (1959) has shown to have occurred about 4,000 years ago in the southern part of the Western Australian coastline. The geomorphology of the whole 80 Mile Beach area is interesting and would repay study. The nature of the coastal plain certainly sug-gests that it has been formed by a marine transgression which has only quite recently receded. No surveyed heights for the coastal plain are available but it may very well be less than 10 feet above present sea level, in which case it would indeed have been covered by the maximum rise. On recession of sea level to a steady position round about present mean sea level, which should have occurred by about 2,500 years before present, the shoreline would have been stabilised and the erection of the outer barrier of coastal dunes begun. These dunes are formed of unconsolidated beach detritus—shells, sand and comminuted shell fragments—of a generally white colour with some superficial grey staining by humus. They are clearly very much younger than some of the coastal dunes seen in places between Carnarvon and the North-West Cape which consist of red sand with a core of consolidated limestone. On the other hand the dunes of the 80-Mile Beach form a belt up to 2 miles wide, and as many as 25 parallel ridges can be counted in the aerial photographs. Whether this volume of material could have been thrown up in 2,500 years. at the rate of one ridge per century, is an open question. It seems feasible, and the time scale seems not to allow of any other interpretation. A complication is that the dune system is only continuous from Mandora northwards and has been breached in the south where the lines of dunes are only intermittently present. This suggests that there has been minor transgression and retreat since the major stabilisation at 2,500 B.P.

Another point of some major interest about this arca is the estuarine shape of the coastal plain running inland to an actual creek at its head. It would certainly appear that this has been the mouth of a river that was important in more pluvial times before the aridity which produced the desert dunes. That it was a large river is also probable and it is tempting to speculate that this may have been the ancient mouth of the Sturt Creek which terminates today in Lake Gregory, its onward course blocked by the desert dunes. Whatever it may have been it is not necessary to postulate that the river was active at the time of the recent maximum sea-level, only that the embayment existed and was filled by the transgression of the sea. It is proposed that it be known as the Mandora Estuary. If the suggestion that the features of this area were formed so recently is not tenable, then we have to go back to the Pleistocene and accept a very much longer isolation of the mangroves from the open sea.

The map which is reproduced herewith is reduced from a vegetation map of the area prepared from aerial photo-mosaics at a scale of 1 mile to 1 inch.

## REFERENCE

CHURCHILL, D. M. 1959. Late Quaternary Eustatic Changes in the Swan River District. Journ. Roy. Soc. W.A., 42: 53-55.

## FIELD NOTES ON THE WHITE-BREASTED ROBIN

## By R. H. STRANGER, West Perth

Little is know about the behaviour and general habits of the White-breasted Robin (Eopsaltria georgiana) and until Pepper (W. Aust. Nat., 10, 1965) described the calls of two captive birds only two call notes had been recorded, a harsh "chit chit" and a whistling "wee-oh." Hence I take this opportunity to place on record observations made by myself at Banksiadale between September 22 and October 8, 1964.

Around Banksiadale the White-breasted Robin is essentially an inhabitant of the thickets growing along the small streams in the gullies of the Darling Range, but it does stray into the adjacent jarrah forest in search of food, and I even observed a pair of birds, which appeared to be resident in their surroundings, at a distance of some quarter of a mile from the nearest stream and accompanying thicket.

When in flight the birds make a fluttering noise with their wings and when bringing food to the young continually collide noisily with the foliage. I suspect this is done to induce the young birds to beg more intensely thereby revealing their position (the fledglings move around fairly freely) to the adult bringing food.

Like the Western Yellow Robin (Eopsaltria griseogularis) the White-breasted Robin sometimes glides for short distances before coming to perch. Another habit of both species is to jerk the wings and tail, but the White-breasted Robin does this more frequently than the Yellow Robin. When the tail is jerked the Yellow Robin elevates it only slightly, whereas the White-breasted Robin, although it too usually elevates the tail only slightly, frequently raises the tail to an angle of some 45deg. from the general line of the body. A feature of both species is that they droop their wings and this is particularly noticeable in the Whitebreasted Robin. The habit of remaining motionless when elinging to the side of a tree is also common to both species, but the White-breasted Robin does not remain "frozen" for as long as the Yellow Robin, and neither does it perch in this manner as often as the Yellow Robin. It would also seem that the Whitebreasted Robin is shyer and does not allow one to approach as closely as does the Yellow Robin.

Like the Yellow Robin, the White-breasted Robin obtains most if not all of its food on the ground, and when foraging for food it perches in even the smallest of bushes, on rocks, stumps and logs, and clings sideways to trees, blackboys, blackboy stalks, perpendicular branches of bushes and bracken fern stems. From these vantage points, though the bird may be only a few inches above the ground, it pounces on any insect which may serve as food. But it never remains on the ground for long. Invariably, regardless of whether it did or did not catch whatever it was after,